

Instant Charge Battery System For Portable Electronic Devices

Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates in general to the field of electrical energy storage and delivery devices. In particular, the present invention relates to an instant charge battery and method of charging and discharging same.

2. Prior Art

The two most common electrical energy storage and delivery devices are batteries and capacitors. Batteries prove to be more practical of the two in the majority of applications of portable electric devices due to the fact that they are able to deliver a relatively constant voltage over an extended period of time. With the increase in popularity and dependency on portable electric devices, chargeable batteries are not only practical, but economical as well. The charging time of chargeable batteries varies greatly – anywhere from approximately an hour to several hours, depending upon the size and type of chargeable battery. This charging time contrasts starkly to the charging time for capacitors – which can charge in a matter of seconds. Although capacitors have the advantage of charging quickly, they have the disadvantage of being unable to deliver a constant voltage over a sustained period of time. To achieve the desirable qualities of both, batteries and capacitors can be combined for specific applications.

Battery/capacitor combinations are well known in the art. The most common application of this combination is in the photo flash. In this battery/capacitor combination, a battery is used to charge a capacitor for the purpose of providing a high intensity burst of electricity to flash the strobe of the camera. Another application of the battery/capacitor combination is in portable radio transmitter/receivers. In this combination, the battery provides a constant level of power during the receiving/standby mode. In the transmission mode, however, the radio requires a burst of power to transmit the signal. The capacitor provides that burst of supplemental power during radio transmission. In both of these applications, the battery is used to charge the capacitor, which, in turn, is used to provide energy for the use of an electrical device.

Prior art of a battery/capacitor combination in which the capacitor charges the battery exists in hybrid automobiles. In this configuration, the braking force of the hybrid vehicle is converted into electrical energy by a generating device. This electrical energy is then stored in a double layer capacitor, which in turn, charges a storage battery. There is, however, no prior art of battery/capacitor combinations where the capacitor provides a charging current to the battery of a portable electronic device. There certainly exists the need for battery/capacitor hybrids combining the quick charge qualities of capacitors with the constant level and extended delivery of electrical energy qualities that batteries possess for the operation of portable electronic devices.

SUMMARY OF THE INVENTION

The present invention solves the drawbacks of long charging times for chargeable batteries by utilizing capacitors to quickly capture electrical energy – which, in turn, is transferred to a chargeable battery. A single capacitor will not effectively charge a battery. However, multiple capacitors – each delivering its individual charge to a chargeable battery over period of time will provide at least a partial charge to the battery. The prolonged transfer of energy from the capacitor portion to the chargeable battery portion enables the battery to charge more efficiently. Furthermore, a chargeable battery can sustain damage if it is charged too quickly. It is therefore necessary to space each capacitor's transfer of energy to the chargeable battery. The charge circuit portion accomplishes this regulation of the capacitor portion's energy to the chargeable battery portion. The charge circuit portion can either utilize a predetermined time interval in between each capacitor's transfer of energy to the chargeable battery – or (since a battery can overheat when it charges too quickly) it can utilize a temperature sensor to determine when the battery has cooled-down sufficiently before it allows the next capacitor to transfer its energy to the chargeable battery. The number, size and type of capacitors for the capacitor portion of the Instant Charge Battery System For Portable Electronic Devices will be dependent upon the size and type of battery utilized – which, in turn, will be dependent upon the energy requirements of the portable electronic device used. The charge circuit portion therefore optimizes the amount as well as the rate of transfer of electrical energy from the capacitor portion to the chargeable battery portion.

The Instant Charge Battery System For Portable Electronic Devices will prove to be useful in a wide range of applications. It will be especially effective in low power

consumption portable electronic devices such as, but not limited to, cell phones, PDA's, MP3 players, digital cameras and notebook computers.

In one embodiment of the invention, multiple capacitors comprise the capacitor portion. The size and number of capacitors required for the capacitor portion is determined by the amount of electrical energy required to charge the battery portion.

In another embodiment of the invention, the capacitor portion only provides a partial charge to the chargeable battery portion. This embodiment would be an important feature of an electronic device for use in emergency situations.

In yet another embodiment of the invention, the capacitor and charge circuit portions are integrated into the electrical device, such that the battery portion is separate and replaceable.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic block diagram of an electrical energy storage device in accordance with one embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 is a block diagram illustrating the schematic structure of the Instant Charge Battery System For Portable Electronic Devices apparatus according to one embodiment of this invention.

The DC power source provides the electrical energy necessary to charge the capacitor portion 1 of the Instant Charge Battery System For Portable Electronic Devices apparatus. It can be in the form of an AC transformer such as to convert household AC electricity into the appropriate DC voltage and current for the charging of the capacitor portion 1. The DC power source can also be in the form of a DC adaptor (such as a car adaptor) so as to convert a DC voltage and current (such as from an automobile power outlet) into the appropriate DC voltage and current for the charging of the capacitor portion 1. The AC/DC converter and/or DC adaptor may be either internal or external to the electrical device utilizing the Instant Charge Battery System For Portable Electronic Devices apparatus.

Capacitor portion 1 comprises multiple capacitors for instantly capturing electrical energy from the DC power source. This captured electrical energy is then transferred to the

chargeable battery portion 3 via the charge circuit portion 2. The charge circuit portion 2 regulates the charging of the chargeable battery portion 3 from the capacitor portion 1.

The multiple capacitor configuration of the capacitor portion 1 allows for effective charging of the chargeable battery portion 3 by spreading-out the charging time to the chargeable battery 3. This prolonged charging time is accomplished via the charge circuit portion 2 as it regulates the sequential transfer of each capacitor's electrical energy from the capacitor portion 1 to the chargeable battery portion 3. The charge circuit portion 2 can either utilize a predetermined time interval in between each capacitor's transfer of energy to the chargeable battery portion 3 – or it can utilize a temperature sensor to determine when the battery portion 3 has cooled-down sufficiently before it allows the next capacitor of the capacitor portion 1 to transfer its energy to the chargeable battery portion 3.

The chargeable battery portion 3 can be of any rechargeable battery cell(s) such as, but not limited to, NiCad, NiMH or Lithium-ion. The chargeable battery portion 3 may consist of either singular or multiple chargeable battery cells.

The electrical device can be any instrument or equipment that requires electrical energy in order to operate. The present invention would be exceptionally useful for portable electronic devices such as cell phones, PDA's, notebook/laptop computers, MP3 players, digital cameras, radios, etc. - especially with the advent of low power consumption technology for these types of devices.

It is noted that the embodiments of the Instant Charge Battery System For Portable Electronic Devices apparatus described herein in detail for exemplary purposes are, of course, subject to many different variations in structure, design, application and methodology. Due to the many varying and different embodiments that may be made within the scope of the inventive concept(s) herein taught, and due to the many modifications that may be made in the embodiments herein detailed in accordance with the descriptive requirements of the law, it is to be understood that the details herein are to be interpreted as illustrative and not in a limiting sense whatsoever.